

Advanced Algebra Review
Assignment # _____

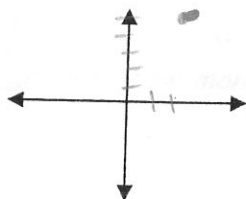
Name key

Complex Numbers

1. The general form a complex number is $a+bi$

2. The additive inverse of $-7 + 4i$ is $7 - 4i$

3 Graph: $2 + 5i$



4 Simplify

a. $\sqrt{-20}$

$2i\sqrt{5}$

b. $8 + \sqrt{-25}$

$8 + 5i$

c. $(5 + 2i) + (-2 - 6i)$

$3 - 4i$

d. $6i \cdot 7i$

-42

e. $(5 - i)(2 + 5i)$

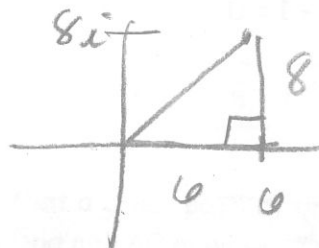
$10 + 25i - 2i + 5$
 $15 + 23i$

d. $(10 - \sqrt{-49}) - (4 - \sqrt{-16})$

$10 - 7i - 4 + 4i$
 $6 - 3i$

5 Solve: $|6 + 8i| = 10$

$6^2 + (8)^2 = c^2$
 $100 = c^2$
 $\sqrt{100} = c$



Factoring

Factor each of the following.

6. $x^2 + 2x - 35$

$(x+7)(x-5)$

7. $3x^2 - 21x$

$3x(x-7)$

8. $4x^2 - 25$

$(2x-5)(2x+5)$

9. $10x^2 - 17x + 3$

$(5x-1)(2x-3)$
 $10x^2 - 15x - 2x + 3$
 $5x(2x-3) - 1(2x-3)$

9. $3a^3 - 21a^2 - 24a^2$

$3a^2(a-15)$
 $3a^3 - 45a^2$

10. $12c^2 - 3c - 20cd + 5d$

$(3c-5d)(4c-1)$
 $3c(4c-1) - 5d(4c-1)$

Quadratic equations.

Solve by factoring.

11. $x^2 - 9x + 20 = 0$

$$(x-5)(x-4) = 0$$

$$x = 5, 4$$

12. $3x^2 - 7x = 6$

$$3x^2 - 7x - 6 = 0$$

$$3x^2 - 9x + 2x - 6 = 0$$

$$3x(x-3) + 2(x-3) = 0$$

$$3x+2=0 \quad x-3=0$$

$$x = -2/3, 3$$

13. $x^2 - 36x = 0$

$$x(x-36) = 0$$

$$x=0 \quad x-36=0$$

$$x = 0, 36$$

Solve by completing the square.

14. $x^2 - 10x + 30 = 0$

$$x^2 - 10x + 25 = -5$$

$$(x-5)^2 = -5$$

$$x-5 = \pm i\sqrt{5}$$

$$x = 5 \pm i\sqrt{5}$$

15. $2x^2 + 6x - 8 = 0$

$$x^2 + 3x + 4 = 0$$

$$x^2 + 3x + \frac{9}{4} = -\frac{14}{4} + \frac{9}{4}$$

$$\left(x + \frac{3}{2}\right)^2 = -\frac{7}{4}$$

$$x + \frac{3}{2} = \pm \sqrt{-\frac{7}{4}} \rightarrow x = \frac{-3 \pm \sqrt{7}}{2}$$

Solve by using the quadratic formula. Round the solutions to the nearest hundredth.

16. $2x^2 + 3x - 1 = 0$

$$\frac{-3 \pm \sqrt{3^2 - (4 \cdot 2 \cdot -1)}}{4}$$

$$\frac{-3 \pm \sqrt{9+8}}{4}$$

$$\frac{-3 \pm \sqrt{17}}{4}$$

28, 1.78

17. $-2x^2 + 5x = -3$

$$\frac{-5 \pm \sqrt{5^2 - (4 \cdot -2 \cdot 3)}}{-4}$$

$$\frac{-5 \pm \sqrt{25+24}}{-4}$$

$$\frac{-5+7}{-4} \quad \frac{-5-7}{-4}$$

$$(-1/2, 3)$$

Write a quadratic equation with integral coefficients that has the given solutions.

18. 4 and -7

$$(x-4)(x+7) = 0$$

$$x^2 + 3x - 28 = 0$$

19. $\frac{3}{4}$ and $\frac{1}{2}$

$$(4x-3)(2x-1) = 0$$

$$8x^2 - 10x + 3 = 0$$

Use the discriminant to tell how many solutions the equation has and if they are real or imaginary.

20. $6x^2 - 5x + 3 = 0$

$$25 - 4(6)(3)$$

$$25 - 72 = -47$$

2 imag

21. $3x^2 + 2x - 7 = 0$

$$4 - (4 \cdot 3 \cdot -7) = 0$$

$$4 + 84 = 88$$

2 real

22. $x^2 - 20 = x$

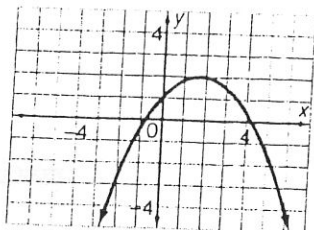
$$0 - (4 \cdot 1 \cdot -20)$$

$$0 + 80$$

2 real

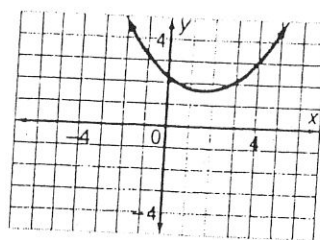
Based on the given graphs, how many real roots does each equation have?

23.



2 real

24.



0 real

Use a graphing calculator to determine the number of times that the graph of each equation intersects the x-axis.

23. $y = 2x^2 - 7x + 12$

0 real roots

24. $y = -x^2 + 9x - 11$

2 real roots

Solve.

25. A landscape architect designed a garden path such that a grass path of uniform width surrounds a rectangular fountain. The fountain is 60 m long and 40 m wide. The area of the grass path is 616 sq m. Determine the width of the grass path to the nearest hundredth of a meter.



$$(2x+60)(2x+40) + 2400 = 616$$

$$4x^2 + 80x + 120x - 616 = 0$$

$$4x^2 + 200x - 616 = 0$$

$$4(x^2 + 50x - 154) = 0$$

2.9 m wide

$$x^2 + 50x + 625 = 779$$

$$(x+25)^2 = 779$$

$$x+25 = \sqrt{779} = 2.9, -52.9$$

26. A smoke jumper jumps from 1500 ft. The function describing the height is $y = -16t^2 + 1500$ where y represents the height in feet and t represents time in seconds. How long is the jumper in free fall if the parachute opens at 1000 ft?

$$1000 = -16t^2 + 1500$$

$$-500 = -16t^2$$

$$t = 5.6$$